WHAT IS CLAIMED IS:

1. A semiconductor device, wherein a semiconductor substrate has a semiconductor element which is formed in a major surface, and at least some of edges where side surfaces of the semiconductor substrate and a backside surface of the major surface cross comprise curved surfaces having a radius of curvature of 0.5 to 50 μm.

2. The device according to claim 1, wherein the curved surfaces are formed at all portions where the side surfaces and the backside surface of the semiconductor substrate cross.

3. The device according to claim 1, wherein the semiconductor substrate has a rectangular shape, and the curved surfaces are formed at edges corresponding to long sides of the semiconductor substrates.

4. The device according to claim 1, wherein the semiconductor substrate has a thickness of 20 to 60 μm.

5. The device according to claim 4, wherein the semiconductor substrate preferably has a thickness of 20 to 40 μm.

6. The device according to claim 1, which further comprises bonding pads formed on the major surface side of the semiconductor substrate, and in which the curved surfaces are formed in regions outside the bonding pads.

7. The device according to claim 1, which further comprises a guard ring formed on the major surface side of the semiconductor substrate, and in which the curved surfaces are formed in regions outside the guard ring.

8. The device according to claim 1, wherein the curved surfaces have no inflection points.

9. The device according to claim 1, wherein the backside surface of the semiconductor substrate is a mirror surface.

10. A method of manufacturing a semiconductor device, comprising:

forming trenches from a major surface side of a semiconductor wafer having an element formed thereon, along dicing lines or chip division lines of the semiconductor wafer, the trenches having a depth not to reach a backside surface of the semiconductor wafer;

removably affixing a surface protection tape to an element formation surface of the semiconductor wafer;

executing backside grinding of the semiconductor wafer to simultaneously thin the semiconductor wafer and separate the semiconductor wafer into individual semiconductor substrates; and

forming curved surfaces having a radius of curvature of 0.5 to 50 μm at at least some of portions where side surfaces and a backside surface of the semiconductor substrate cross.

11. The method according to claim 10, wherein the curved surfaces are formed at all portions where the side surfaces and the backside surface of the semiconductor substrate cross.

12. The method according to claim 10, wherein the semiconductor substrate has a rectangular shape, and the curved surfaces are formed at edges corresponding to long sides of the semiconductor substrates.

13. The method according to claim 10, further comprising after executing backside grinding of the semiconductor wafer to simultaneously thin the semiconductor wafer and separate the semiconductor wafer into individual semiconductor substrates,

mirror-finishing the backside surface of the semiconductor wafer.

14. The method according to claim 10, wherein the trench formation is executed using one of a diamond scriber, a diamond blade, and a laser scriber.

15. The method according to claim 10, further comprising after the trench formation, cleaving the semiconductor wafer from the trenches.

16. The method according to claim 10, further comprising before or after the surface protection tape removably affixing, attaching the surface protection tape to a wafer ring.

17. The method according to claim 10, wherein an interval between the semiconductor substrates is not

less than 10 μm.

18. The method according to claim 10, wherein the curved surface formation includes one of a mechanical process, a chemical process, and a combination of mechanical and chemical processes.

19. The method according to claim 10, wherein the curved surface formation includes at least one of CMP, wet etching, and dry etching.

20. The method according to claim 10, wherein an interval between the semiconductor substrates corresponds to a kerf width.